

## **FILE A - For Optional Classroom Use**

Science and Technology:

Released Items ..... A-2

Social Studies:

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Mathematics:

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# **Science and Technology**

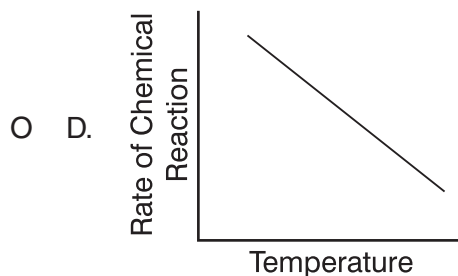
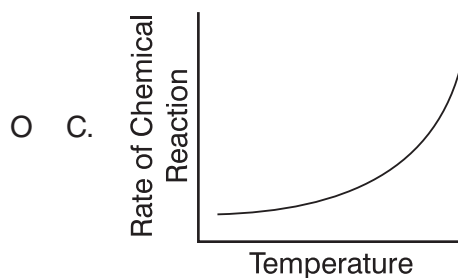
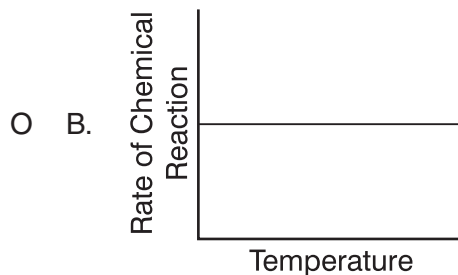
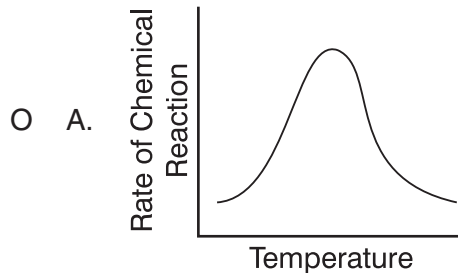
## **Released Items**

1. Which product would likely cause the **most** environmental problems if placed in a landfill?
  - ☐ A. newspaper
  - ☐ B. aluminum can
  - ☐ C. battery
  - ☐ D. plastic container
2. Lenses such as those in telescopes and microscopes depend on which property of light?
  - ☐ A. refraction
  - ☐ B. diffraction
  - ☐ C. interference
  - ☐ D. polarization
3. In today's atomic models, what accounts for most of the volume of an atom?
  - ☐ A. electrons
  - ☐ B. protons
  - ☐ C. neutrons
  - ☐ D. empty space
4. The nitrogen cycle is important to all living things because nitrogen is found in which molecules?
  - ☐ A. saturated fats
  - ☐ B. nucleic acids
  - ☐ C. starches
  - ☐ D. sugars
5. Scientists think that life on Earth began with one-celled organisms when Earth's atmosphere consisted of some or all of the following gases: methane, ammonia, water vapor, hydrogen, carbon monoxide, carbon dioxide, and nitrogen. Which must have been a characteristic of these organisms?
  - ☐ A. cells that had a definite nucleus, but very few other cell structures
  - ☐ B. cells that carried out respiration without oxygen
  - ☐ C. cells that used sugars as the genetic code instead of DNA
  - ☐ D. cells that carried out photosynthesis without light
6. What do scientists assume to be generally true when they gather and interpret data about stars other than the Sun?
  - ☐ A. All stars are the same size as the Sun.
  - ☐ B. All stars are the same distance from Earth.
  - ☐ C. All stars are the same temperature as the Sun.
  - ☐ D. All stars are composed of elements found on Earth.

Use the information below to answer question 7.

In the human body, the enzyme pepsin helps break down proteins to amino acids. Pepsin is most effective around  $37^{\circ}\text{C}$ . A student plans to conduct an experiment by placing the same amount of pepsin in beakers containing a protein solution that is at various temperatures ranging from  $10^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ .

7. Which graph **best** illustrates the expected results for this investigation?



8. In long-exposure photographs taken at night, the stars appear as curved lines rather than as single points. This observation is evidence that
- ☐ A. the stars orbit our galaxy.
  - ☐ B. the stars are moving away from our galaxy.
  - ☐ C. Earth rotates on its axis.
  - ☐ D. Earth revolves around the Sun.

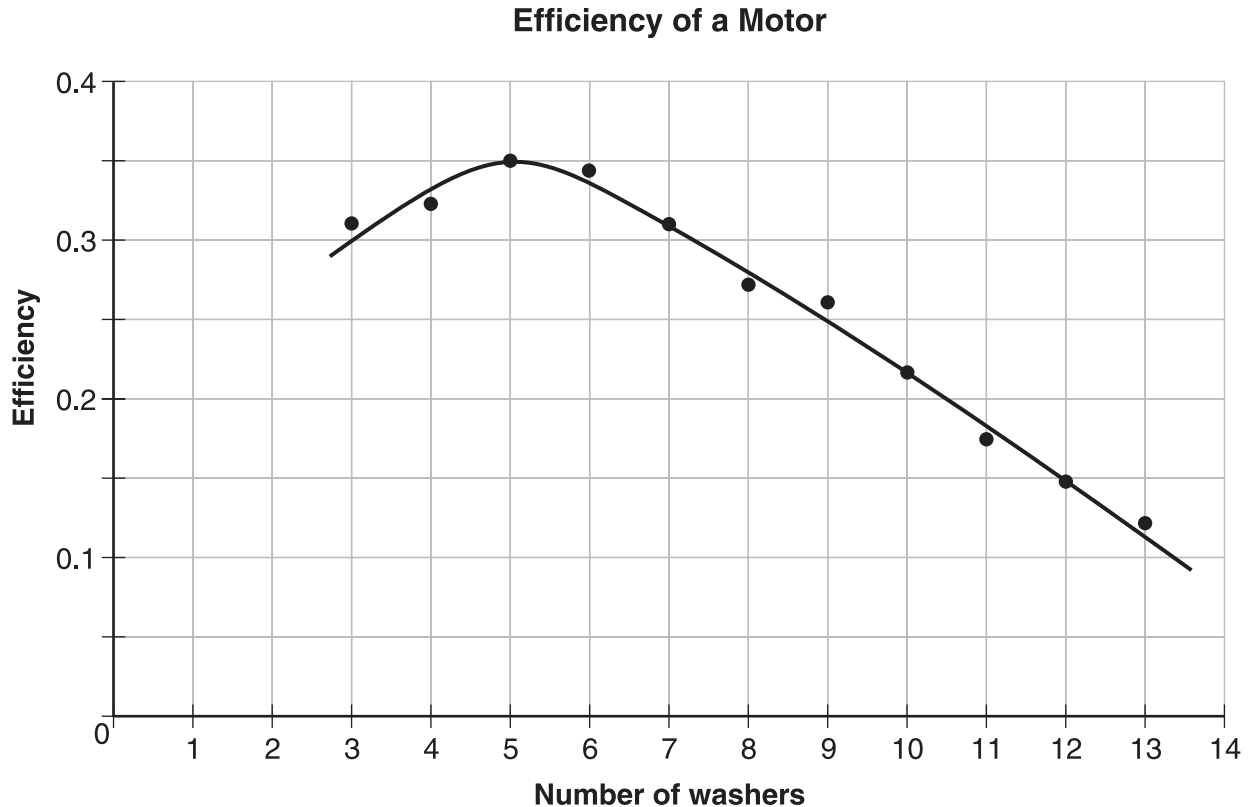
Use the information below to answer question 9.

#### Two Theories of How the Moon Was Formed

1. The “great impact” theory suggests that a celestial body hit Earth’s surface. Molten material then flew off into space, was caught by Earth’s gravity, and formed the Moon.
  2. The “capture” theory suggests that a passing body was captured by Earth’s gravity. This body then began to orbit Earth as its moon.
9. Which piece of scientific evidence best supports the “great impact” theory?
- ☐ A. The Moon’s orbit is not directly above Earth’s equator.
  - ☐ B. Newton’s law of universal gravitation explains the Moon’s orbit.
  - ☐ C. The Moon’s composition is similar to that of Earth’s outer layer.
  - ☐ D. The same side of the Moon always faces Earth.

Use the information and graph below to answer question 10.

The graph below shows the efficiency of a small motor as it lifts washers a distance of 2 meters.



10. Which statement is **best** supported by the graph?

- ☐ A. The motor's efficiency when lifting 8 washers is greater than when lifting 5 washers.
- ☐ B. The motor's efficiency when lifting 3 washers is about the same as when lifting 7 washers.
- ☐ C. The motor's efficiency increases as more washers are lifted.
- ☐ D. The motor's efficiency is not related to the number of washers lifted.

11. Which would most likely decrease the rate of photosynthesis?

- ☐ A. an increase in the amount of water
- ☐ B. an increase in the amount of light
- ☐ C. a decrease in the amount of carbon dioxide
- ☐ D. a decrease in the amount of oxygen

12. What is produced when an acid reacts with a base?

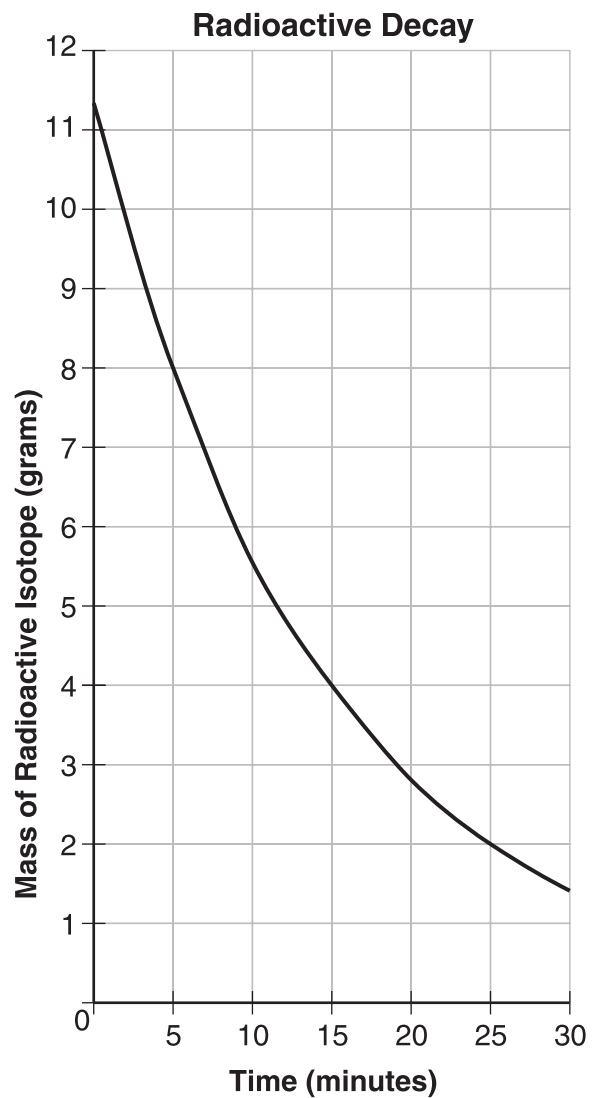
- ☐ A. nitrogen and hydrogen
- ☐ B. carbon and hydrogen
- ☐ C. a sugar and water
- ☐ D. a salt and water

Use the information below to answer question 13.

There are various hypotheses as to why dinosaurs became extinct. The meteorite hypothesis links the extinction to a meteorite colliding with Earth. The volcanic activity hypothesis associates the extinction with an increase in volcanic eruptions.

13. The discovery of a large crater (several miles across) that formed on Earth 65 million years ago could be used as evidence to support which of these hypotheses?
- ☐ A. only the meteorite hypothesis
  - ☐ B. only the volcanic hypothesis
  - ☐ C. both hypotheses
  - ☐ D. neither hypothesis
14. Which type of molecule is important in forming the strong, elastic fibers found in muscles?
- ☐ A. fats
  - ☐ B. sugars
  - ☐ C. starches
  - ☐ D. proteins
15. Which of the following is the primary element used in semiconductors?
- ☐ A. silicon
  - ☐ B. hydrogen
  - ☐ C. nickel
  - ☐ D. potassium

Use the graph below to answer question 16.



16. The half-life of a radioactive isotope is the time it takes for half of the isotope to decay. About how long is the half-life of the radioactive isotope that yielded the data shown in the graph?
- ☐ A. 5 minutes
  - ☐ B. 10 minutes
  - ☐ C. 15 minutes
  - ☐ D. 25 minutes

Use the table below to answer question 17.

| Amount of River Pollution | Average Concentration of Dissolved Oxygen in the River (in parts per million) |        | Typical Organisms Found in the River |
|---------------------------|---|--------|--------------------------------------|
|                           | (5°C)   | (15°C) |                                      |
| none                      | 7.7   | 5.3    | mayfly nymph, salmon, trout          |
| little                    | 6.3   | 4.2    | caddis fly larva, crayfish           |
| some                      | 4.8   | 3.3    | water louse, bloodworm, leech        |
| a lot                     | 1.7   | 1.2    | mosquito larva                       |

17. Which generalization is **best** supported by the information in the table?

- ☐ A. As the pollution of a river increases, less oxygen is dissolved in the water.
- ☐ B. As the temperature of a river increases, more oxygen is found in the water.
- ☐ C. Pollution of a river has only a small impact on the types of animals found in the water.
- ☐ D. Pollution of a river causes the temperature of the water to increase.

18. Which process causes variation among the organisms within a species?

- ☐ A. binary fission
- ☐ B. polyp formation
- ☐ C. sexual reproduction
- ☐ D. asexual reproduction

20. It snows a lot in the upper elevations of Washington, Oregon, and Utah. Which type of air mass causes this condition?

- ☐ A. cold and dry
- ☐ B. cold and humid
- ☐ C. warm and humid
- ☐ D. warm and dry

19. Which of the following produces wind?

- ☐ A. the movement of Earth through space
- ☐ B. the Moon's gravitational pull
- ☐ C. the buildup of opposite electric charges in the atmosphere
- ☐ D. the uneven heating of the atmosphere

21. Various diseases (such as polio, measles, and tuberculosis) occur today at a much lower rate in the United States than in the past. However, these same diseases still occur at a high rate in some countries.
- Discuss **two** technological imbalances that cause this difference in disease rate.
  - Explain **two** ways that the high disease rate in some countries could be lowered.

21.

Use the information and diagram below to answer question 22.

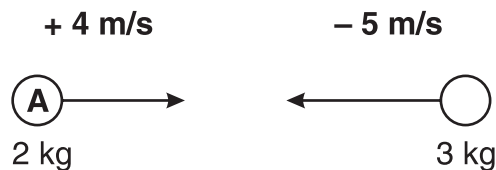
An object's momentum is mathematically defined as the product of its mass and its velocity.

$$\text{momentum} = \text{mass} \times \text{velocity}$$

or

$$p = mv$$

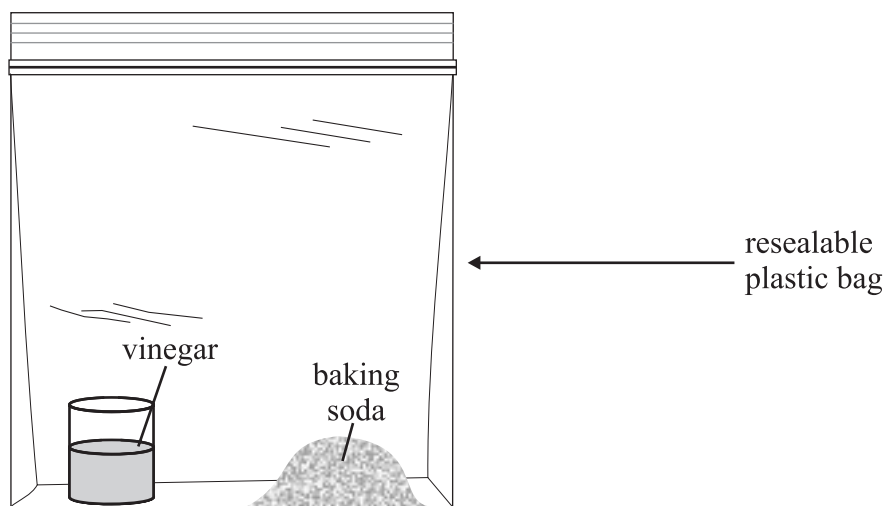
Momentum is a vector quantity; that is, to fully describe momentum you must give a number with appropriate units of measure **and** a direction. When determining the total momentum of colliding objects, the direction of the objects must be taken into account.



22. These two spherical objects are about to collide as they travel along a straight line. A positive sign is used to represent one direction along the line and a negative sign is used to indicate the opposite direction along the line.
- What is the momentum of **object A** before the collision?
  - What is the **total** momentum of the two objects before the collision?
  - If the total momentum is conserved, how will the total momentum after the collision compare to the total momentum before the collision?

22.

Use the diagram below to answer question 23.



23. A student places a container of vinegar into a resealable plastic bag with some baking soda. The bag is then sealed. The student determines the mass of the sealed system, and then the vinegar is allowed to mix with the baking soda.
- Describe what will happen when the mixing occurs.
  - How will the mass of the system after the reaction is complete compare with the initial mass of the system? Explain your answer.

23.

24. In 1953, Stanley Miller and Harold Urey replicated conditions believed to have existed before life appeared on Earth. In a sealed glass container, methane, ammonia, water, and hydrogen were combined. This combination was exposed to heat and electric sparks. After one week, amino acids were found in the container.
- Discuss in detail how the results of this experiment support scientific theories on the origin of life on Earth.
  - Discuss in detail the limitations of this experiment in explaining how life arose on Earth.

24.

25. Which device was necessary for the Industrial Revolution?

- ☐ A. microscope
- ☐ B. telescope
- ☐ C. steam engine
- ☐ D. navigational compass

26. Sound travels through the air by

- ☐ A. mutual gravitational attraction between molecules.
- ☐ B. repulsion between electrically charged molecules.
- ☐ C. random motion of molecules.
- ☐ D. regular vibration of molecules.

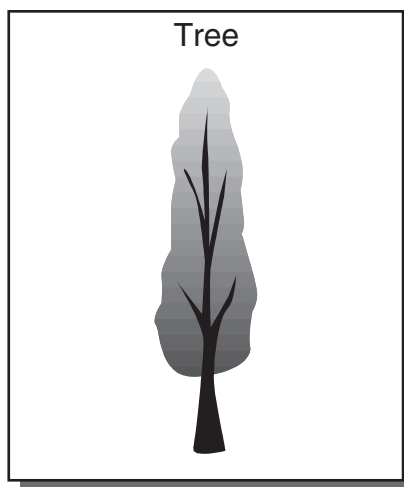
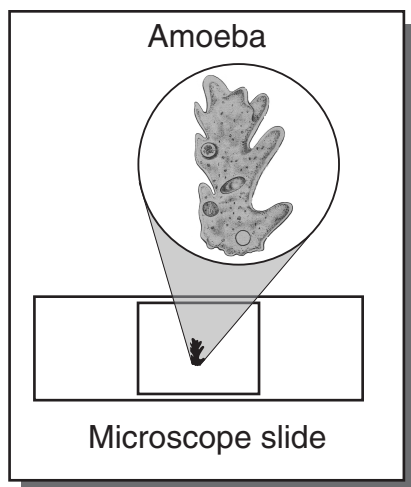
27. Which will increase as a material is heated and a change in temperature occurs?

- ☐ A. the kinetic energy of its molecules
- ☐ B. the potential energy of its molecules
- ☐ C. the charge of its molecules
- ☐ D. the mass of its molecules

28. Objects in space known as quasars are observed moving away from Earth. Which statement explains this observation?

- ☐ A. The universe is very big.
- ☐ B. The universe is expanding.
- ☐ C. Earth revolves around the Sun.
- ☐ D. Earth rotates on its axis.

Use the pictures below to answer question 40.



40. All living things have certain characteristics in common. Identify **four** of these characteristics and describe a way in which the amoeba and the tree differ with respect to each characteristic.

40.

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41. The theory of plate tectonics states that the continents move as part of crustal plates. Based on this statement, make **three** predictions of how Earth will look different in 50 million years and give a scientific explanation for each of your predictions.

41.

# **Social Studies**

## **Released Items**

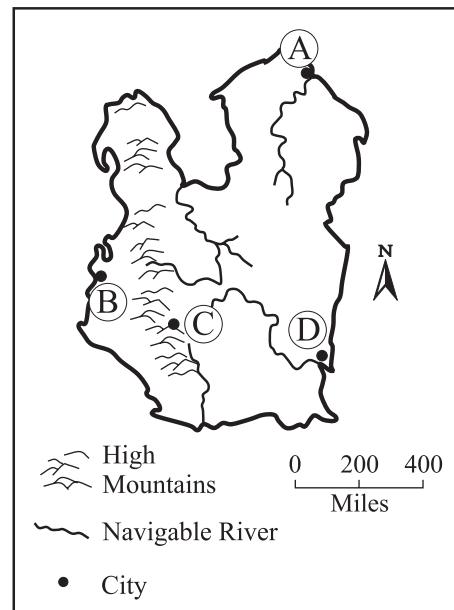
1. In different types of economic systems, there are different factors that influence economic decisions. In colonial times, early settlers came to the New World planning to take up the same jobs their families had always done and farm the same crops their families had always grown. This kind of economic decision making is typical of a
- ☐ A. command economic system.
  - ☐ B. traditional economic system.
  - ☐ C. market economic system.
  - ☐ D. mixed-market economic system.

*Use the list below to answer question 2.*

- Truman Doctrine
  - Space race
  - Containment Policy
  - Domino theory
  - Berlin Wall
2. All of the above are **most closely** associated with
- ☐ A. the Korean War.
  - ☐ B. World War I.
  - ☐ C. World War II.
  - ☐ D. the Cold War.

3. Voters are required to register in order to
- ☐ A. provide census information.
  - ☐ B. prevent election fraud.
  - ☐ C. encourage membership in a party.
  - ☐ D. discourage uninformed voting.

*Use the map below to answer question 4.*



4. Which landform would **most likely** be found near city A?
- ☐ A. a delta
  - ☐ B. a peninsula
  - ☐ C. a plateau
  - ☐ D. a volcano

Use the map below to answer question 5.



5. Some geographers consider Mexico to be part of North America, while other geographers argue that Mexico is part of Latin America. Which statement **best** supports the idea that Mexico is part of North America?

- ☐ A. Mexico and North America have political ties based on similar political parties.
- ☐ B. Mexico and North America have economic ties based on common currency.
- ☐ C. Mexico and North America have cultural ties based on a common language.
- ☐ D. Mexico and North America have physical ties based on geographic location.

6. Which **best** describes the economic term “net income”?

- ☐ A. the value of your job benefits such as health insurance
- ☐ B. the money you have left after all your living expenses are paid
- ☐ C. your take-home pay after deductions
- ☐ D. your weekly salary multiplied by 52

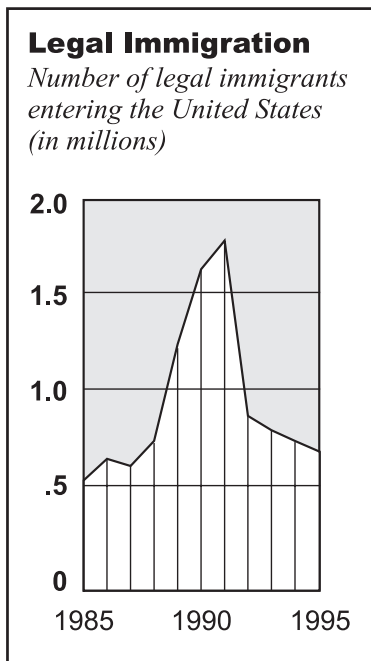
7. The purpose of advertising can be to inform, to influence, or to do both. All of the following give **factual** information about a vacation area **except**

- ☐ A. daily cost per person for rooms.
- ☐ B. events and activities available.
- ☐ C. testimonials by previous famous visitors.
- ☐ D. transportation costs and car rental rates.

8. In recent years, the United States has had a trade deficit—it buys more than it sells. Which of the following would be **most likely** to lower the trade deficit?

- ☐ A. increasing exports and reducing imports
- ☐ B. lowering the quality of exported goods
- ☐ C. increasing taxes on exports
- ☐ D. eliminating all strategic exports

Use the graph below to answer question 9.



9. Based on the information in the graph, which of the following is the **best** conclusion?

- ☐ A. People no longer wanted to immigrate to the United States in the 1990s.
- ☐ B. The number of legal immigrants declined in the 1990s.
- ☐ C. The United States admitted too many immigrants in the 1990s.
- ☐ D. The number of illegal immigrants rose in the 1990s.

10. You are writing a report about the early 1900s. This period, known as the Progressive Era, was a time of many social, economic, and political reforms. Which of the following would be the **best** example of a reform to the political system?

- ☐ A. The Pure Food and Drug Act was passed to make food and medicine safer for consumers.
- ☐ B. Child labor laws were passed, limiting work hours and improving safety conditions.
- ☐ C. Conservation was pushed by the president and more national parks were added.
- ☐ D. A constitutional amendment was ratified, allowing the people to directly elect senators.

11. In recent years, Russia and other countries have been moving from a command economy to a market economy. A country moving from a command economy to a market economy will **most likely**

- ☐ A. increase government control of business.
- ☐ B. establish a new political system.
- ☐ C. reduce government control of business.
- ☐ D. establish a new monetary system.

Read the following passage about power and the qualities of a leader to answer question 12.

“Upon this a question arises: whether it be better to be loved than feared or feared than loved? It may be answered that one should wish to be both, but, because it is difficult to unite them in one person, [it] is much safer to be feared than loved. . . .”

Niccolo Machiavelli in *The Prince*

12. Which of the following twentieth-century world leaders would **best** fit Machiavelli’s description above?
- ☐ A. Joseph Stalin
  - ☐ B. Winston Churchill
  - ☐ C. Franklin Roosevelt
  - ☐ D. Mahatma Gandhi
13. In which country is the majority of the population Muslim?
- ☐ A. Brazil
  - ☐ B. India
  - ☐ C. Japan
  - ☐ D. Saudi Arabia

Read the statements below to answer question 14.

- The president, as commander in chief, can send troops to a foreign country.
  - Congress influences foreign aid by the amount of money it includes in the budget for foreign aid.
  - The president’s secretary of state is responsible for United States relations with foreign countries.
14. Which of the following is the **best** conclusion that can be made from these statements?
- ☐ A. The power to make foreign policy is divided between the legislative and executive branches.
  - ☐ B. The president has complete responsibility for foreign policy.
  - ☐ C. The power to make foreign policy is divided between the president and the Cabinet.
  - ☐ D. The Congress has more influence than the executive branch in making foreign policy.
15. The United States government influences the economy in many ways. One action the government takes is to make consumer protection laws. Which of the following is the **best** example of a consumer protection law?
- ☐ A. People must register before they vote.
  - ☐ B. People cannot discriminate on the basis of race.
  - ☐ C. Companies must test new medical drugs before they can be sold.
  - ☐ D. Companies cannot force people to work in unsafe conditions.

Use the table below to answer question 16.

| 2000 Federal Budget                        | Spending<br>(\$ billions) |
|--|---------------------------|
| Physical, Human and Community Development  | 140                       |
| Medicare and Medicaid                      | 217                       |
| Interest on the Debt                       | 236                       |
| National Defense and International Affairs | 284                       |
| Social Security                            | 413                       |

16. The government rarely collects enough money from taxes to provide all of the services and programs people want. Which category of spending would have had the greatest direct economic effect on low-income people if its monies were cut?

- ☐ A. Physical, Human, and Community Development  
☐ B. Medicare and Medicaid  
☐ C. Interest on the Debt  
☐ D. National Defense and International Affairs

17. Listed below are foreign policy agreements by various countries.

- Appeasement
- Rome-Berlin Axis
- Atlantic Charter—Four Freedoms
- Nonaggression Pact
- Lend-Lease Act

With which event are all these agreements associated?

- ☐ A. World War I  
☐ B. World War II  
☐ C. Korean War  
☐ D. Vietnam War

18. Which condition is **least** likely to contribute to revolution within a country?

- ☐ A. when economic and political influence are evenly distributed  
☐ B. when major businesses and natural resources are owned by foreign companies  
☐ C. when there are income gaps between social classes  
☐ D. when one group has most of the political power

19. You are doing research for a geography report and you find a recent daylight satellite photograph of Africa. This would be **most helpful** for determining

- ☐ A. patterns of human migration.  
☐ B. data about population density.  
☐ C. boundaries of natural regions.  
☐ D. shifts in agricultural land use.

Use the statement below to answer question 20.

“Conflicts over religion and resources have shaped the history of these Middle Eastern countries.”

20. Which group of countries is **best** described by the statement?

- ☐ A. Kenya, Nigeria, Zaire  
☐ B. Iran, Israel, Syria  
☐ C. Costa Rica, Mexico, Nicaragua  
☐ D. Indonesia, Myanmar, Thailand

21. The prices of similar goods or products can vary greatly. For example, one music CD might cost \$3.99, while another costs \$16.99.

Using **economic** terms, fully explain **three** reasons why the price of a good or product can vary so much.

21.

[illegible]

22. The Industrial Revolution, which took place in the 1700s and 1800s, was a turning point in the history of the United States and Western Europe.
- Briefly describe what the Industrial Revolution was.
  - Fully explain **three** examples of how the Industrial Revolution changed the social and/or economic lives of people. Be sure to include historical details in your explanation.

22.

23. Changes in weather or climate can have a major effect on regions. The Northeast has had below average snowfall the last few winters. Consider what would happen if Maine had **two** times its average snowfall next year.

Choose **two** of the areas listed below.

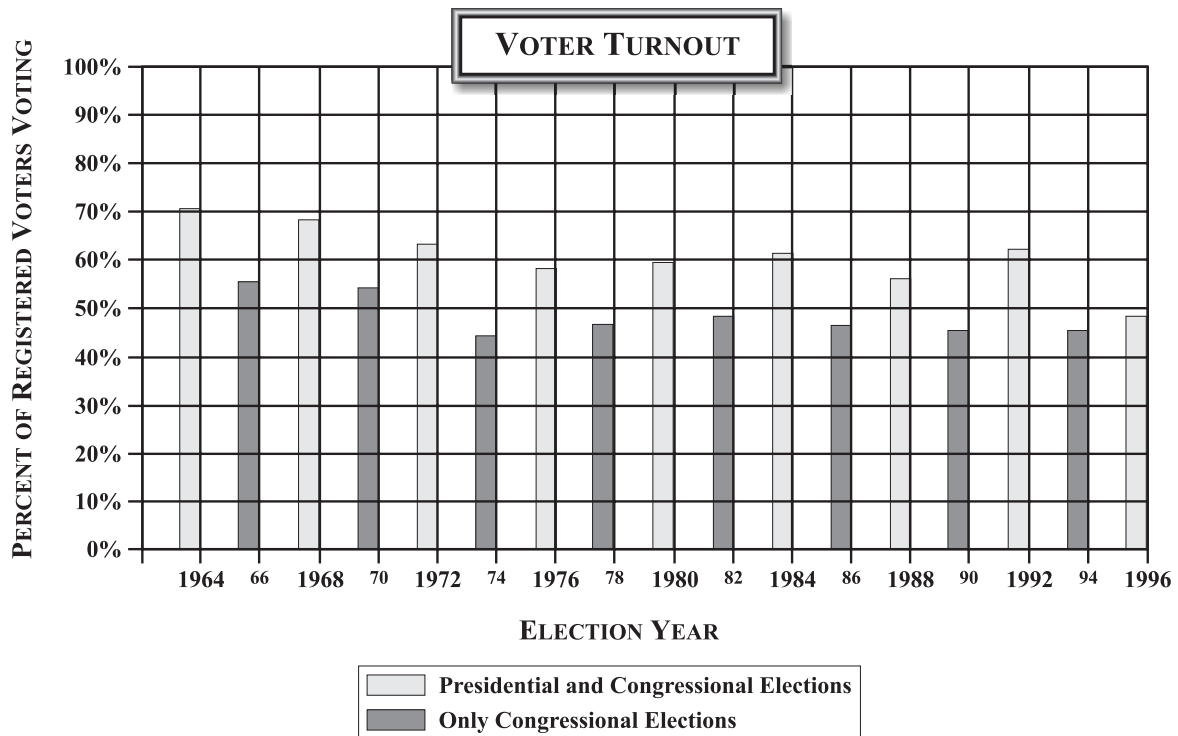
- government income and spending
- business sales and profits
- Maine teenagers

For **each** area you choose, give a complete explanation of **one** positive **economic** effect and **one** negative **economic** effect. Be sure to explain the connection between increased snowfall and the economic effect you are describing.

23.

[illegible]

Use the graph below to answer question 24.



24. a. Describe the trend the graph shows in the percentage of voters taking part in elections between 1964 and 1996.
- b. Explain **two** reasons for this trend.
- c. Describe **one** effect this trend has had on elections.

24.

25. You are writing a report on a current world crisis. What would most likely be the **best** source for information on recent developments?

- ☐ A. dictionary
- ☐ B. magazine article
- ☐ C. fiction book
- ☐ D. encyclopedia

26. Nations have a comparative advantage when they are able to produce a product at a lower cost than another country. Which country would **most likely** have a comparative advantage in selling the product mentioned?

- ☐ A. tea grown in England
- ☐ B. steel produced in Afghanistan
- ☐ C. rice grown in Canada
- ☐ D. oil produced in Saudi Arabia

27. Agriculture is difficult in Japan because much of the land

- ☐ A. is mountainous.
- ☐ B. is forested.
- ☐ C. receives little rainfall.
- ☐ D. lies below sea level.

*Read the Supreme Court decision below to answer question 28.*

The court ruled unanimously that, “guarantee of counsel is one of our fundamental rights . . . In our system of criminal justice, any person who is too poor to hire a lawyer, cannot be assured a fair trial . . .”

1963 *Gideon v. Wainwright*

28. In the Gideon decision, the Supreme Court was protecting which constitutional right?

- ☐ A. religious and political freedom (Amendment 1)
- ☐ B. freedom from unreasonable search and seizure (Amendment 4)
- ☐ C. rights of the accused (Amendment 6)
- ☐ D. right to a jury trial in civil cases (Amendment 7)

40. The religions listed below have had a major impact on world history.

- Buddhism
- Christianity
- Hinduism
- Islam
- Judaism

a. Choose **one** religion and write your choice.

b. Answer **either** question 1 or question 2 below, **not both**.

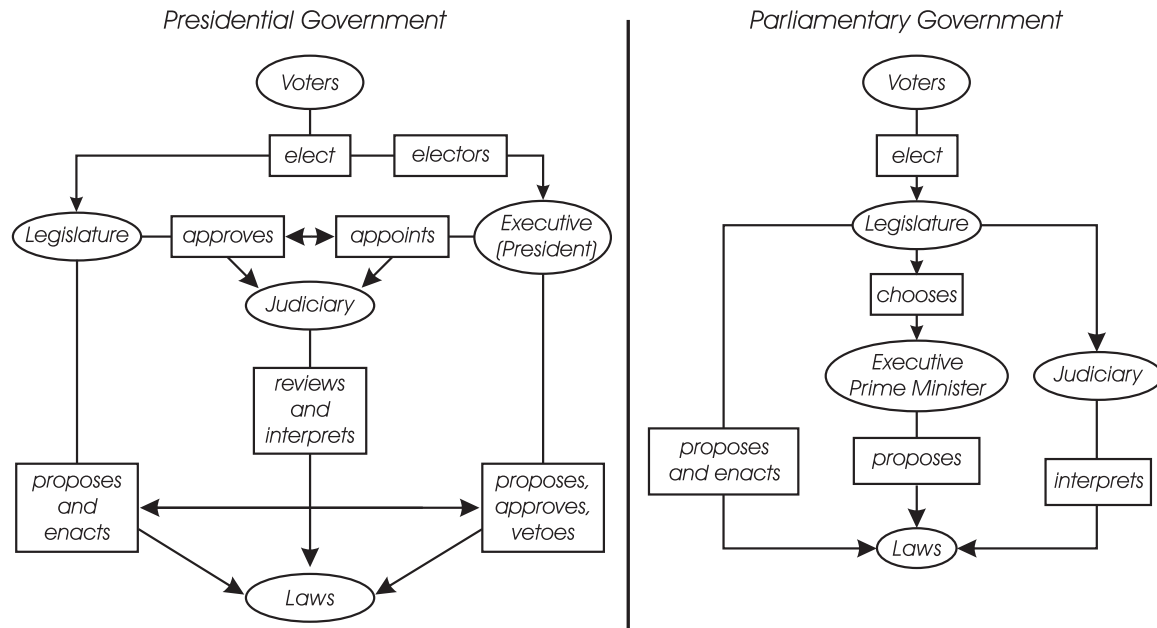
- Question 1: What was the origin or beginning of the religion you chose?
- Question 2: What are two major beliefs of the religion you chose?

c. Explain **two** important ways the religion you chose has had an impact on world history. Be sure to include specific historic details.

40.

Use the diagram below to answer question 41.

## Comparison of Presidential and Parliamentary Governments



41. This diagram illustrates the organization of a presidential government (such as the United States) and the organization of a parliamentary government (such as Great Britain).
- Identify which **branch** of the parliamentary government has the most power **and** fully explain why.
  - Identify in which **system** of government, presidential or parliamentary, the voters have the **least** influence **and** fully explain **two** reasons why.

41.

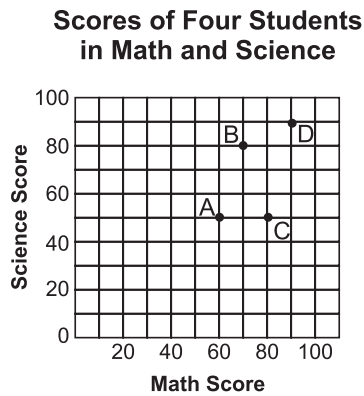
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# **Mathematics**

## **Released Items\***

- \* Students were not allowed to use a calculator to answer items 1 through 5, 9 through 13, 16, and 17. Students could use a calculator for all other mathematics items.

Use the graph below to answer question 1.



- Which student had the **greatest difference** in mathematics and science scores?
  - ☐ A. student A
  - ☐ B. student B
  - ☐ C. student C
  - ☐ D. student D
- Which expression yields a **negative** result?
  - ☐ A.  $(-5)^{16}$
  - ☐ B.  $(6 - 9)(-4 + 2)$
  - ☐ C.  $-3(-4)^9$
  - ☐ D.  $-2^9$

- The sophomore class is sponsoring a dance for students in the ninth through twelfth grades. The price for the tickets sold in advance is \$5.00 and the price for the tickets sold at the door is \$6.00. The ticket sales are shown in matrix S.

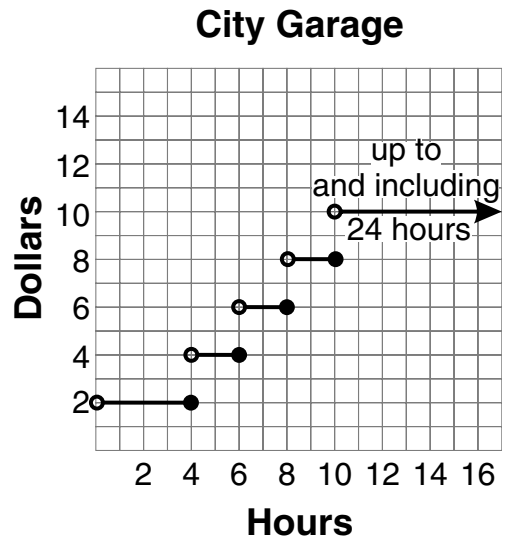
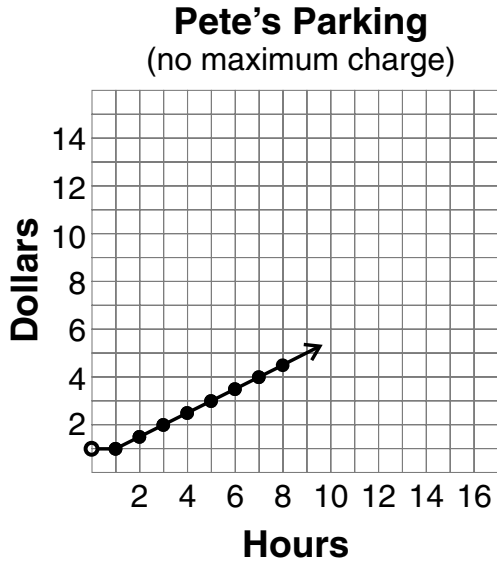
$$S = \begin{bmatrix} \text{Advance Sales} & \text{Door Sales} \\ 10 & 15 \\ 27 & 31 \\ 42 & 12 \\ 16 & 27 \end{bmatrix} \begin{matrix} 9\text{th} \\ 10\text{th} \\ 11\text{th} \\ 12\text{th} \end{matrix}$$

The sophomores need a price matrix, P, that can be used with matrix S to find a matrix that shows the amount of money students in each class paid to attend the dance. Which of the following is the matrix they need?

- ☐ A.  $P = \begin{bmatrix} \$5.00 & \$6.00 \end{bmatrix}$
- ☐ B.  $P = \begin{bmatrix} \$5.00 \\ \$6.00 \end{bmatrix}$
- ☐ C.  $P = \begin{bmatrix} \$6.00 & \$5.00 \end{bmatrix}$
- ☐ D.  $P = \begin{bmatrix} \$6.00 \\ \$5.00 \end{bmatrix}$

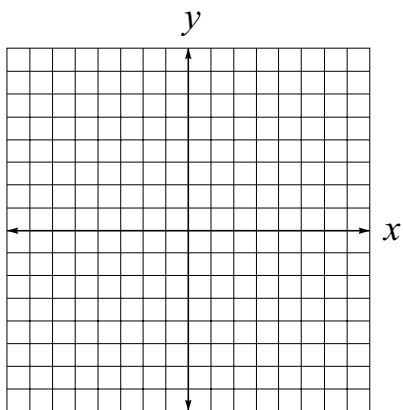
Use the graphs below to answer question 4.

## Parking Charges



4. Which of the two parking facilities will charge the **least** for 24 hours of parking?
- ☐ A. City Garage
  - ☐ B. Pete's Parking
  - ☐ C. They both charge the same.
  - ☐ D. Not enough information is given.

You may use the grid below to help answer question 5.

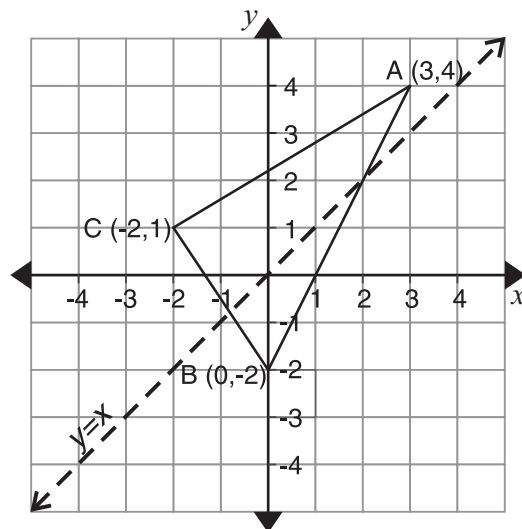


5. Line  $\ell$  passes through the points (1,1) and (-3,4). Which point is also on line  $\ell$ ?
- ☐ A. (5,-2)
  - ☐ B. (4,-3)
  - ☐ C. (-1,2)
  - ☐ D. (-2,5)

9. Samantha and Tim began saving money to buy cars on January 1st of this year. Samantha saves \$120 each month, and Tim saves \$80 each month. After how many months will Samantha have saved exactly \$1,000 more than Tim? Show how you found your answer.

9.

Use the graph below to answer question 10.



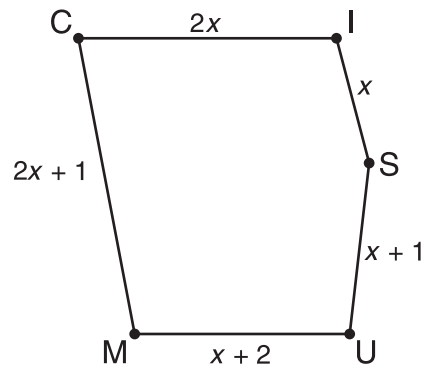
10. a. If  $\triangle ABC$  shown above is rotated  $180^\circ$  clockwise about the point (0,0), what will be the coordinates of A'?
- b. If  $\triangle ABC$  shown above is reflected over the line  $y = x$ , what will be the coordinates of the image of point A?

10.

11. Marcia earns \$6 per hour answering phones. On another job, she earns \$8 per hour doing data entry. Last week she worked 30 hours and earned \$206.
- Write two equations that together represent the information given above.
  - Use your equations** from part a to find the number of hours Marcia worked at each job. Show all your work.

11.

Use the figure below to answer question 12.



12. The perimeter of polygon MUSIC is 25 feet. Find the length of side CM. Show all the steps you used to find your answer.

12.

13. Arrange the following numbers in order from **least to greatest**.

$$1\frac{3}{4}, \sqrt{9}, \frac{8}{5}, (0.5)^2, \pi$$

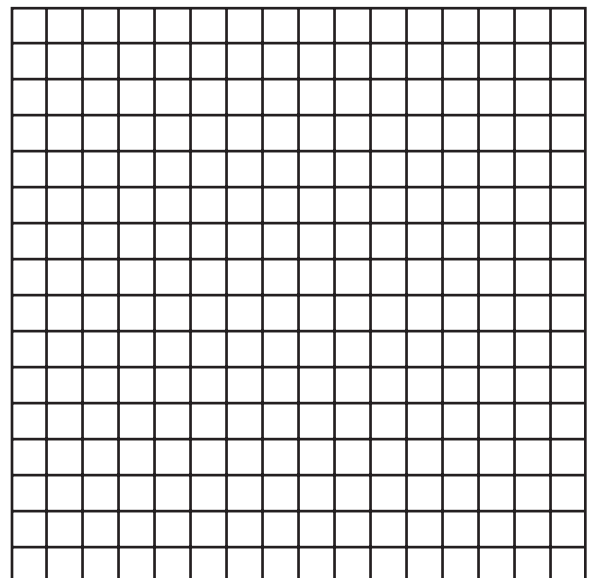
13.

16. A chemical company is formulating a new antifreeze with the following freezing points for various concentrations of the antifreeze mixed with water.

| Concentration | Freezing Point |
|---------------|----------------|
| 0%            | 0°C            |
| 10%           | -3°C           |
| 14%           | -5°C           |
| 26%           | -12°C          |
| 38%           | -23°C          |
| 44%           | -30°C          |

- Construct a graph showing the freezing point for various concentrations of antifreeze. Connect the points to form a smooth line or curve.
- Use your graph to estimate the freezing point produced by a concentration of 30%.
- Use your graph to estimate the concentration that would produce a freezing point of -40°C.

16.

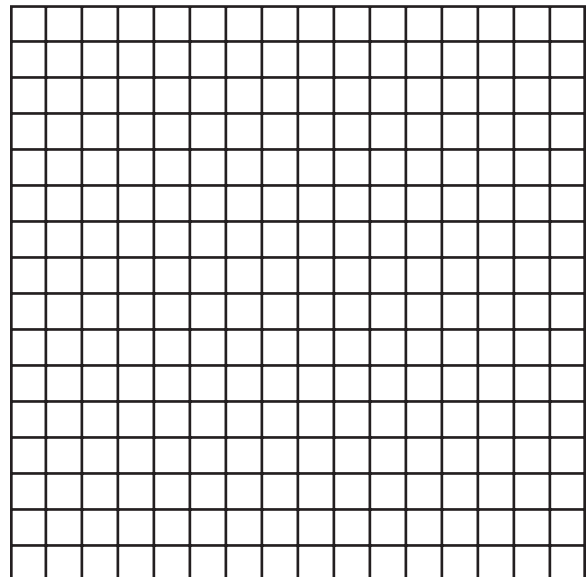


17. The Varsity Club sells hot dogs and hamburgers at school home games. Club members are trying to decide how many each of hamburgers and hot dogs to order for the homecoming game. They had collected the following data on sales at the previous ten games.

| GAME                      | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
|---------------------------|----|----|----|----|----|----|----|----|----|----|
| Number of hot dogs sold   | 30 | 41 | 49 | 60 | 71 | 39 | 20 | 46 | 60 | 64 |
| Number of hamburgers sold | 60 | 63 | 70 | 80 | 76 | 73 | 65 | 77 | 80 | 73 |

- On the grid below, construct a scatter plot by graphing these data. Put the number of hot dogs sold along the horizontal axis and the number of hamburgers sold along the vertical axis. Draw a line of best fit on your graph.
- For the homecoming game, the Varsity Club has traditionally had 200 sales, some of which were hamburgers and some of which were hot dogs. Based on this information and the data from the previous ten games, predict how many hamburgers they can plan to sell. Explain how you made your prediction.

17.



Use the matrix below to answer question 19.

|          | Store |     |     |     |
|----------|-------|-----|-----|-----|
|          | A     | B   | C   | D   |
| T-shirts | 350   | 412 | 248 | 376 |
| Towels   | 152   | 125 | 97  | 108 |
| Sandals  | 243   | 305 | 186 | 252 |

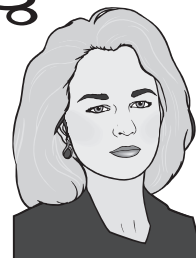
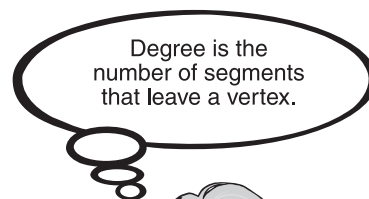
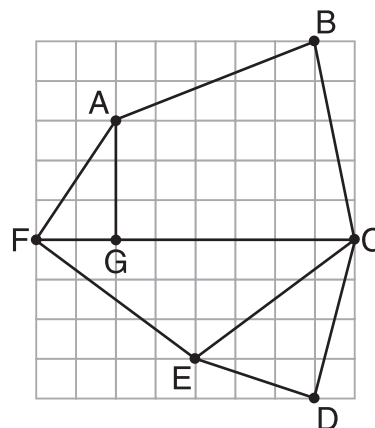
19. This matrix represents the number of items sold at each of four stores during the past week. Which store sold the greatest number of towels for the week?

- ☐ A. Store A
- ☐ B. Store B
- ☐ C. Store C
- ☐ D. Store D

20. If the area of a rectangle is  $8x^2 - 12x$ , the dimensions of the rectangle could be

- ☐ A.  $4x$  and  $(2x - 3)$ .
- ☐ B.  $4x$  and  $(x - 3)$ .
- ☐ C.  $2x$  and  $(x - 3)$ .
- ☐ D.  $4x$  and  $2x$ .

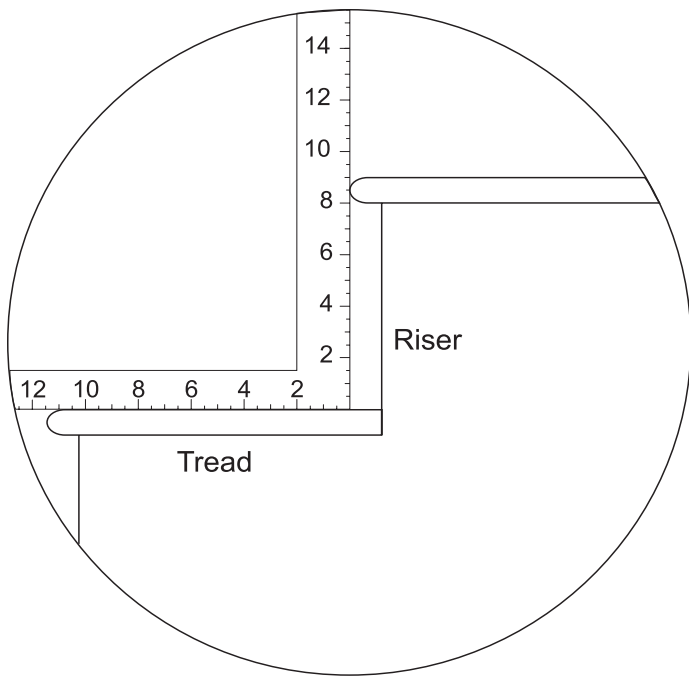
Use the network below to answer question 21.



21. How many vertices of this network have a degree that is an odd number?

- ☐ A. 2
- ☐ B. 3
- ☐ C. 4
- ☐ D. 5

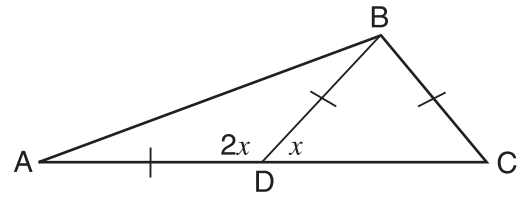
22. The diagram below shows a carpenter's square, which is used to measure riser height and tread length.



A carpenter has been asked to replace a staircase with one that rises at an angle that is less steep. To do this, the carpenter should

- ☐ A. increase the tread length and the riser height proportionally.
  - ☐ B. decrease the tread length and the riser height proportionally.
  - ☐ C. increase the riser height, leaving the tread length the same.
  - ☐ D. increase the tread length, leaving the riser height the same.
23. The lengths of three sides of a triangle are in the ratio of 3:4:5 and the perimeter of the triangle is 48 inches. What is the length of the **longest** side of the triangle?
- ☐ A. 15 inches
  - ☐ B. 20 inches
  - ☐ C. 25 inches
  - ☐ D. 28 inches

Use the triangle below to answer question 24.

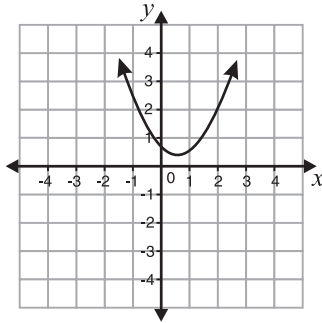


NOT TO SCALE

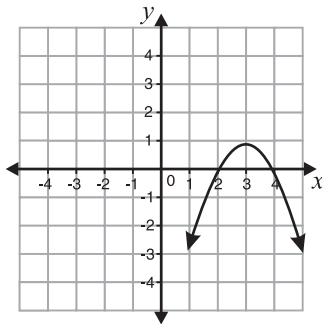
24. If  $AD = BD = BC$  and the measure of  $\angle ADB$  is twice the measure of  $\angle BDC$ , what is the measure of  $\angle ABC$ ?
- ☐ A.  $70^\circ$
  - ☐ B.  $80^\circ$
  - ☐ C.  $90^\circ$
  - ☐ D.  $100^\circ$
25. For which operations on real numbers does the commutative property hold?
- ☐ A. addition and subtraction
  - ☐ B. subtraction and division
  - ☐ C. division and multiplication
  - ☐ D. multiplication and addition
26. Jane noticed that a helium balloon rose only 50% as far in each minute as it did in the previous minute. After the first minute the balloon had risen 300 feet. How far did the balloon rise in the first **four** minutes?
- ☐ A. 450 feet
  - ☐ B. 562.5 feet
  - ☐ C. 581.25 feet
  - ☐ D. 750 feet

27. Which quadratic function has no real number zeroes?

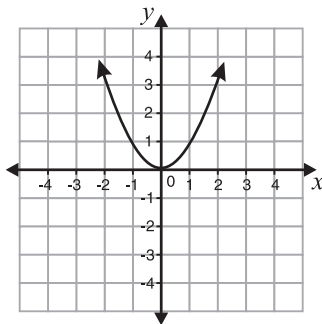
☐ A.



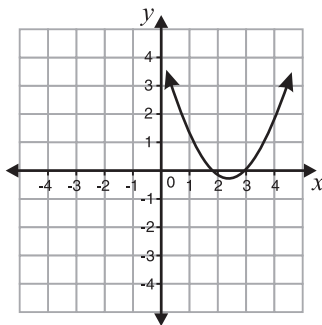
☐ B.



☐ C.



☐ D.



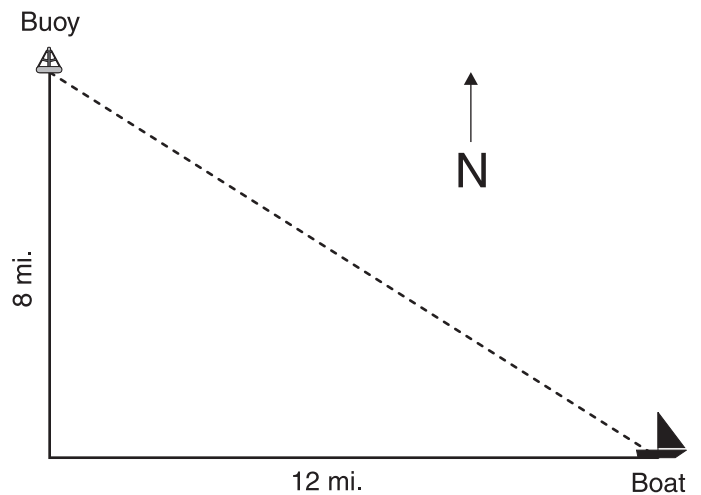
28. The Pizza Palace's price list for plain pizzas is shown below.

| Diameter | Cost    |
|----------|---------|
| 10"      | \$5.00  |
| 12"      | \$7.20  |
| 14"      | \$9.80  |
| 16"      | \$12.80 |

Based on this information, what would a 20" pizza likely cost?

- ☐ A. \$10.00  
☐ B. \$16.20  
☐ C. \$17.20  
☐ D. \$20.00

Use the figure below to answer question 29.



29. Bart started at the buoy shown above and traveled 8 miles due south, then 12 miles due east. To the nearest 0.1 mile, how far is Bart from the buoy?

- ☐ A. 20.8  
☐ B. 16.0  
☐ C. 14.4  
☐ D. 10.0

30. Jamie's sock drawer contained 6 black socks, 8 brown socks, 10 white socks, and 2 red socks, randomly mixed together. Jamie reached into the drawer in the dark and pulled out two socks. What is the probability that both socks were white?

☐ A.  $\frac{19}{51}$   
☐ B.  $\frac{9}{65}$   
☐ C.  $\frac{9}{13}$   
☐ D.  $\frac{1}{310}$

31. In a factory, three machines complete their operating cycles as follows.

Machine I: every 7 minutes

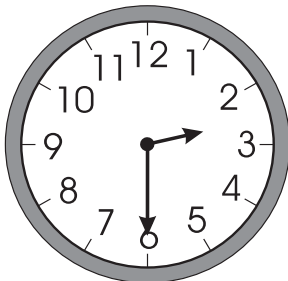
Machine II: every 3 minutes

Machine III: every 12 minutes

If all three machines begin a cycle at exactly 3:00 P.M., what is the next time when they will all begin a cycle together?

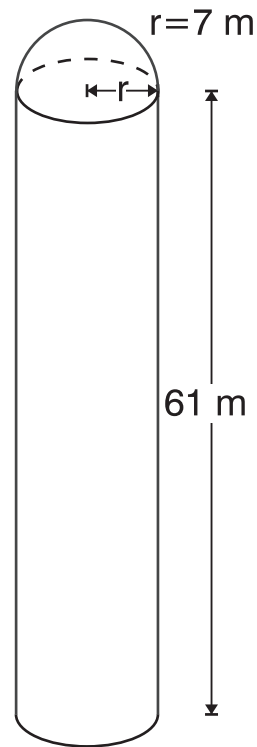
☐ A. 5:52  
☐ B. 4:24  
☐ C. 3:22  
☐ D. 3:36

32. What is the measure of the angle between the minute hand and the hour hand when the time on the clock is 2:30?



☐ A.  $120^\circ$   
☐ B.  $105^\circ$   
☐ C.  $75^\circ$   
☐ D.  $60^\circ$

Use the diagram below to answer question 33.



33. This diagram shows a fuel tank for a rocket that is shaped like a cylinder topped by a hemisphere. The radius of both the cylinder and the hemisphere is 7 m. What is the approximate volume of the tank?

☐ A.  $9,490 \text{ m}^3$   
☐ B.  $9,590 \text{ m}^3$   
☐ C.  $10,110 \text{ m}^3$   
☐ D.  $10,830 \text{ m}^3$

34. On a trip to Boston, Elizabeth averaged 40 mph for the first hour and then 60 mph for the next four hours. What was her average speed on the whole trip?

☐ A. 50 mph  
☐ B. 52 mph  
☐ C. 54 mph  
☐ D. 56 mph

35. Karl needs to have his car towed to a repair shop. He received the following estimates for towing.

Best Towing.....\$32 plus \$2.00 per mile

Ace Towing.....\$26 plus \$2.50 per mile

Bert's Towing.....\$50 for 0–20 miles

\$100 for 21–50 miles

If the distance to the repair shop is 35 miles, what is the **least** amount he could pay for towing?

- ☐ A. \$ 70.00
- ☐ B. \$ 82.50
- ☐ C. \$100.00
- ☐ D. \$102.00

42. Eight players are entered in a tournament. The chart below shows who will play in each of the first four games.

| Game 1 | Game 2 | Game 3 | Game 4 |
|--------|--------|--------|--------|
| Albert | Jan    | Victor | Martha |
| Emma   | Kathy  | Maria  | Jessie |

The winner of Game 1 will play the winner of Game 2 and the winner of Game 3 will play the winner of Game 4. The winners of those two games will play for the championship.

When answering parts **a through c**, assume that all players have an equal chance of winning each game.

- What is the probability that Albert will win the tournament? Explain or show how you found your answer.
- What is the probability that Albert and Kathy will play a game against each other? Explain or show how you found your answer.
- What is the probability that Albert and Jessie will play a game against each other? Explain or show how you found your answer.
- Suppose that Victor is the least skilled player and has only a 25% chance of winning a game against every one of the other players. What would be the probability that Victor will win the tournament? Explain or show how you found your answer.

42.

43. Fatsound Guitar Company manufactures two basic electric guitar models, the Model T and the Model S.
- The Model T requires 5.5 hours to assemble, and the parts cost the company a total of \$120.
  - The Model S requires 4.0 hours to assemble, and the parts cost the company a total of \$144.
- a. If the company pays its assembly workers an average of \$9.00 per hour, what will the cost be to manufacture one Model T guitar?
  - b. Write an algebraic equation to represent the cost of assembling each guitar, including the cost of parts. Let  $x$  represent the average hourly pay of the assembly workers and  $y$  represent the cost to manufacture the guitar.
  - c. At what hourly rate will the cost of assembling the two models be the same? Show or explain how you found your answer.

43.

# **Visual and Performing Arts**

## **Released Items**

1. Describe three characteristics that are important when evaluating the quality of a dance performance **and** explain why each is important.

1.

2. You just attended an exciting performance of the Bangor Symphony Orchestra. Using at least four musical terms, explain what made the concert an exciting experience.

2.